Remote control

Field of the invention

The invention relates to a method and system for remote super-
vision of automatic milking systems and/or animals of the kind
5   defined in the preambles of claims 1 and 12, respectively.

Background of the invention

Milking related processes of today are more or less automated,
whereby the milking of animals may be performed by means of
automatic milking systems (AMS), i.e. systems in which teat
10   cups are automatically attached to the teats of the animal.
However, this automatization requires supervision and a farmer
needs, for example, to make sure that nothing happens to the
animals and that the milking operations run smoothly. It would
be an expensive solution to have a person on duty supervising
15   the AMS and the animals at all times, and this is thus not
feasible.

An automatic milking station includes, among other things, a
milking robot and one or more computer(s), controlling the
processes performed by the milking station. The automatic
20   milking station can thus be manoeuvred by means of the at
least one computer, and data concerning for example the milk-
ing processes can be shown on a screen. The screen may be a
touch sensitive screen by means of which data and/or commands
may be entered in order to manoeuvre the milking station. The
25   AMS includes, in most cases, also at least another computer,
located in the vicinity of the milking station. This computer
preferably includes (or is connected to) a database containing
information about the herd, specifying for example milking
logs, ratios of fodder etc. This computer, if present, may be
30   connected, by means of a modem or Ethernet or the like, to yet
another computer located e.g. conveniently in the farmer's
house. This system provides means for the farmer to see the

same data in the house as if he was in the stable building. However, a farmer is thus dependent on the computer located in the farmer's house, and has to have access to it. If he is working in the fields or travelling about he probably has no means to access the computer located in his house. Further, he has no means to correct errors that have occurred, but has to go to the stable building in order to take care of a failure.

There are means for alerting a farmer by means of an e-mail or an SMS (Short Message Services) to a cellular phone or a PDA (Personal Digital Assistant) belonging to the user. However, these devices are limited to receiving at rather low data rates (e.g. 9,6 kb/s), and it is realised that the alarm can only inform the user that a failure has occurred and no details about the failure. He has no means to attend to a failure, but has to contact a service provider who can solve the problem or he has to go to the stable building himself.

Another option to alert a farmer according to the state of the art is to have the computer that is connected to the milking station call a predetermined telephone, whereby a synthetic voice informs the farmer that a failure has occurred. Again, this solution does not provide means for correcting the failure, nor can the farmer obtain desired details about the failure.

Published patent application EP 0 857 418 describes a construction comprising a milking robot for automatically milking animals. The construction includes a computer with a screen, by means of which a remote service department can be informed of problems occurring in a given part of the construction. The computer can however only alert the remote service provider that a failure has occurred, but not correct a failure, though means are included for facilitating the exchange of broken

parts. The system as described in this document thus requires a person to go to the stable building and solve the problem that has occurred. Further, the alarm is always sent to a computer at the service provider, that is, to a specific place where the supervision is performed.

There thus exists a need for a system by means of which a milking station can be supervised at a distance regardless of the location of the farmer, and regardless of the apparatus that the farmer has access to at a specific moment. Further, means for remote correction of occurred failures are needed.

Summary of the invention

It is an object of the present invention to provide a method and a system for enabling a convenient and reliable way for a user, located at a distant location, to supervise and retrieve information about an automatic milking system and the animals being part of the user's herd, and thereby providing a user with monitoring means regardless of his location.

This object is achieved by a method as defined in the characterising portion of claim 1, and by a system as defined in the characterising portion of claim 12.

In accordance with the present invention, a method is provided for remote supervision of an automatic milking system being adapted to handle animals and comprising at least one milking station and computer means. The method includes the steps of creating web-documents containing information about said milking station and/or animals obtained from said computer means, establishing a connection between the milking system and a communication unit, and transmitting created web-documents to the communication unit. Thereby a user is able to supervise the automatic milking system and/or the animals even when located far away form the stable. The user may further use dif-

ferent kinds of apparatuses, for example a mobile phone, a computer, a PDA or a laptop, in order to e.g. check the status of a milking station. The user may thus access the automatic milking system from any communication unit, and is not re-

5   stricted to use a specially adapted communication unit.

In accordance with an embodiment of the present invention the method includes the further step of having the automatic milk-ing system receive information from a communication unit. The user is thereby enabled also to transmit information or in-

10 structions to the automatic milking system, thereby avoiding the need to go to the stable buildings in order to correct certain types of failures. The user may alternatively specify what kind of information he wants to receive. This feature provides the user with a great flexibility in that he does

15 need to actually go to the stable building, but can correct some failures from a distance.

In accordance with another embodiment of the present invention the step of creating a web-document comprises using a web-server including a program for creating web-documents. Thereby

20 an easy way for providing web-documents and information about a milking station and/or animals of the herd is provided, giv-ing an easy and non-expensive way to implement the present in-vention.

In accordance with another embodiment of the present invention

25 the method includes the further step of customizing said web-documents to a specific communication unit, before the trans-mission. This enables the user to receive only desired infor-mation, only predetermined information or receiving informa-tion that is adjusted in consideration of the capacity of the

30 particular communication unit that the user presently has handy. A user is thereby not limited to the use of a specific,

stationary computer in order to be updated about the status of
a milking station, but is able to use any communication unit
available.

In accordance with another embodiment of the present invention
5   the at least one computer connected to the at least one milk-
ing station in said system receives specific instructions from
a communication unit. These instructions are preferably input
by a user of the communication unit by means of a user inter-
face, such as a keyboard. The settings of the milking station
10   can thereby be remote manipulated by the user of the communi-
cation unit. The user may from a distance manipulate and pos-
sibly correct a failure that has occurred, thereby avoiding
the need to go to the stable building and correct the failure
in situ.

15   In accordance with another embodiment of the present invention
said step of establishing a connection between a communication
unit and the automatic milking system is performed upon a cer-
tain event, for example an alarm. The connection may be auto-
matically set up at an event, or it may be set up at a user's
20   request. The connection is initiated either from the communi-
cation unit or the automatic milking system, and this enables
a secure supervision of the AMS and/or the animals in that the
user may always be alerted at the occurrence of certain
events.

25   In accordance with another embodiment of the present invention
said computer means comprises two or more computers handling
different functions in the automatic milking system. A first
computer may comprise a database including information about
the herd being handled by the automatic milking system, and
30   another computer may handle the functions of the automatic

milking system. This feature provides great design flexibility
when implementing the invention.

In accordance with another embodiment of the present invention
the system includes a camera. The camera is preferably con-
5   nected to the computer and directed so that it can take images
of the milking station and/or animals. Thereby means are pro-
vided for enabling the sending of images of the at least one
milking station and/or animals to a user of a communication
unit. This gives a convenient way for a user to see the milk-
10   ing station and the animals in the stable building without ac-
tually being there. The user thus receives more information
and thereby is able to make better and correct decisions about
what to do when a failure has occurred, or is simply updated
about the status and the state of health of the animals.

15   In accordance with another embodiment of the present invention
the connection to the milking station is a wide band connec-
tion such as fibre, satellite, (V)LAN, radio or ADSL. These
connections provide great bandwidths, enabling large amounts
of information to be transmitted to a user.

20   The present invention also relates to such a system, whereby
equivalent advantages are obtained.

Brief description of the drawing

Fig. 1 shows one embodiment of the system for supervision of
an automatic milking system in accordance with the present in-
25   vention.

Detailed description of preferred embodiments
Fig. 1 illustrates a system for supervision of an automatic
milking system in accordance with the present invention. The
automatic milking system (AMS) 1 comprises computer means for
30   controlling the processes being performed within the AMS 1.

The computer means may, for example, be implemented as several
computers handling different functions of the automatic milk-
ing system 1. For example, one computer, being part of the
computer means, may control a milking station, and another may
5   be arranged to retrieve and administrate statistics about the
AMS 1. Irrespective of how the computer means is implemented,
information and data may be communicated between all the dif-
ferent parts of it; e.g. in the case of different computers,
the computers may be interconnected. The milking system 1 also
10   includes at least one milking station 2, into which the ani-
mals enter in order to be milked. Other handling processes of
the animals are also performed in the AMS 1, such as after-
treatments of different kinds (e.g. teat treatments), feeding
etc. The milking station 2 in turn includes, among other
15   things, a robot arm handling teat cups, by means of which the
animals are milked. The teat cups are in turn connected to a
vacuum source via a milk hose for enabling the automatic milk-
ing procedure. Milk meters for measuring the amount of milk
are also included, as well as other milking related equipment.
20   The milking station 2 further includes at least one computer
(not shown) and is controlled by means of it. This at least
one computer controls the functions of the milking station 2,
such as for example the milking pumps, the robot arms, feeding
mechanisms etc. The milking station 2 may further include a
screen (not shown) for enabling the displaying of information
to a user, and for providing a means for the user to enter in-
formation and commands to the milking station 2. Further, at
least another computer 3 is preferably connected to the milk-
ing station 2, and preferably also a screen 4 and a user in-
30   terface 5, for example a keyboard. The computer 3 preferably
includes a database containing information about the herd of
animals being handled by the milking station 2. Information
and procedures of interest for a user include for example kind

of food being given to the animals, amount of food, the inter-
val between two milking occasions of an animal (for example
the minimum allowed interval between two milking occasions),
milk data, milk statistics, details about specific animals
5   etc. By means of the present invention, all these functions
may be controlled by the user located at a remote location,
and respectively, all this information may be retrieved by the
user. The computer 3 is in turn connected to a communication
enabling means, such as a modem 6, for enabling communication
10   with an external communication unit 7, 8. In the figure, the
different parts are shown as separate devices. This is however
not necessary, the different parts may in an alternative em-
bodiment of the invention be integrated into one device.

In accordance with the present invention, a device for creat-
15   ing HTML-documents is provided. The device can for example be
a web-server 10, and in the following description a web-server
is used in order to clarify and describe the present inven-
tion. It is however to be understood that the device could be
another device as well, such as a WAP-server (Wireless Appli-
20   cation Protocol). Further, other applications of SGML
(standardized general markup language) than HTML (hypertext
markup language) is considered to be within the scope of the
present invention, such as for example vrml (virtual reality
markup language), xhtml (extensible html), Java or JSP (Java
25   Server Pages).

The web-server 10 includes a program for creating web-
documents, such as a HTML-document, containing information
about the status of a milking station 2 and/or the animals.
Examples of such programs for creating web-documents are pro-
30   grams available from Apache Software Foundation. A user may
retrieve any desired information that is available in the com-
puter 3 (or some other computer, not shown) to the communica-

tion unit, 7, 8 of his or her choice. This communication unit
7, 8 may be any bidirectional communication unit such as a
computer 7, a mobile phone 8, a laptop computer, a PDA (Per-
sonal Digital Assistant) or the like. The mobile phone may be

5 an ordinary 2nd generation phone (adapted for communication in
e.g. GSM), a GPRS (General Packet Radio Service) phone or a 3rd
generation phone (adapted for communication in e.g. Universal
Mobile Telecommunications System (UMTS) or Enhanced Rates for
GSM Evolution (EDGE)) or any other portable, mobile phone. The

10 communication may be enabled by means of a wireless communica-
tion link 9, as well as by any form of physical transmission
means, wired or wireless. The communication is preferably con-
ducted by means of a wide band connection such as fibre, sat-
ellite, (V)LAN (Virtual Local Area Network), radio or ADSL

15 (asymmetrical digital subscriber line) or any other connection
enabling large amount of information to be transmitted. The
web-server 10 creates a web-document containing the informa-
tion demanded by the user, or some predetermined information.
This program thus creates a web-document, for example a HTML-

20 document that can be viewed by means of a web-browser. The
web-server 10 or the computer 3 also includes means for con-
verting this information to different interface protocols, and
the information can be adjusted in dependence of a chosen com-
munication unit 7, 8 to which the information is to be sent.

25 If the selected communication unit 7, 8 is restricted to re-
ceive data at a rather low maximum data rate, which limits the
maximum possible size of the information to be received by it,
the user may select what information should be sent. This can
be done in a number of ways. The user can for example have

30 predetermined settings in the web-server 10, determining the
kind of information that should be sent to a certain kind of
communication unit 7, 8, for example in dependence of the ca-
pacity of the communication unit 7, 8. The adaptation, or cus-

tomizing, of the data to be transmitted may be performed in a
separate step before the actual transmission to the communica-
tion unit 7, 8, or more or less simultaneously with the trans-
mission. The customizing may be performed in different devices
5   or in one and same device.

There is much information and procedures performed by the
milking station 2 that are of interest to a user, as was men-
tioned above. The user may for example want to supervise which
animals have been milked, how much milk they have yielded,
10   kind of food to be given, amount of food, and how long time
has elapsed since the last milking of a certain animal, when a
milk tank was last emptied, the amount of milk in the milk
tank and information about this may be sent to the user. The
energy consumption of the automatic milking system 1, the at-
15   tachment of teat cups (for example number of times the attach-
ment has failed to be completed), supervision of milk meters
(assurance of that they show the correct amount for example)
and functioning of the food dosage are all examples of infor-
mation and procedures of interest to the user. The milking
20   system 1 may further include some threshold values for certain
procedures, which threshold values activate an alarm when
reached. For example, if the energy consumption of the milking
system 1 is reaching a certain threshold, an alarm may be sent
to the user, who is then able to perform a fault-localizing
25   and thereby possibly prevent an interruption of the system.
The created web-documents can be updated as often as desired,
automatically or at request.

In fig. 1, the web-server 10 is shown as a separate device.
However, in an alternative embodiment the web-server 10 or the
30   features of the web-server 10 can be integrated with the com-
puter 3 or the computer of the milking station 2, or any other
computer being part of the computer means of the AMS 1. Irre-

spective of the location of the web-server 10, information may be retrieved from all the other computers of the system and be presented in a web-document.

The user may also send information to the computer 3 and to
5   the web-server 10. This is an additional feature of the present invention, and decreases the need for a farmer to go to the stable building in order to correct a failure. The program creating web-documents has the capability to start other programs. The user may thus, by means of a communication unit 7,
10   8, input instructions, whereby the program creating web-documents affects the programs controlling the milking station 2. The user may for example reboot the system though being at a remote location, or restart certain procedures of the milking station 2 at a distance. The user may also open or close
15   gates in the automatic milking system 1 if such needs arise, or he/she may disconnect certain parts of the system, or certain equipments can be overridden, such as for example sensors for sensing angles of certain robot arm parts or the like. The user may also get a verification that a sent instruction has
20   indeed been carried out.

In accordance with an embodiment of the present invention, a camera 11 is installed within the automatic milking system 1, and being connected to at least one computer, for example by means of Ethernet. The camera 11 can be activated by a user,
25   be active at all times, or be activated when a certain event occurs. The images taken by the camera 11 are sent to the web-server 10 and can thus be transferred to a user of a communication unit 7, 8 located anywhere. The user may thus see what is going on in the stable building regardless of where he or
30   she is, and is thereby able to make correct decisions about whether to take any actions in certain situations, and what actions to take. The camera 11 is not only convenient in case

of failures, but also for enabling the user to supervise the animals and/or the AMS. The camera may for example be activated when a specific animal enters the milking station 2. The user may have had certain problems related to that animal, she may for example be difficult to milk or she may kick the equipment in the milking stable. The user can thus program the camera 11 to take pictures when this animal enters the milking station 2, and can thereby supervise a milking operation and see details about the problem(s) and is thereby able to make a well-grounded decision about how to solve the problem(s). Another example of such an active supervision is that the user may program the web-server 10 to call a certain telephone number when a specific event occurs, for example when a certain animal enters the milking station 2.

Other equipment can also be placed within the system. If a temperature sensor (not shown) is included, it can be used for example to determine when an animal is in heat, and since her behaviour changes as well, also the camera 11 can be used for this purpose. The camera may alternatively be a video camera, enabling video to be shown. An example of yet an additional equipment is a microphone, enabling the user to hear sounds in the stable.

The user may also program the web-server 10 or the computer 3 to start the camera 11 whenever something that should generate an alarm occurs. When the user gets an alarm, he or she may send a request for additional information, such as data about the type of alarm. The user may then request yet further information, the information being retrieved from the computer 3 by means of the web-server 10. The web-server 10 creates a web-document containing the requested information and sends the web-document to the user requesting the information. The requested information may also include pictures taken by the

camera 11. The pictures taken by the camera 11 from for example 5 seconds before an alarm has alerted to 5 seconds after the event may be saved in a computer. The user may thereby get accurate information about the event that generated the alarm, and make decisions accordingly. The user may again get a verification that a sent instruction has been carried through.

In an alternate embodiment pictures taken by the camera 11 are presented on a separate website or webpage. The user may thereby easily access said website or webpage separately in order to see pictures of the stable.

Thus, the present invention provides means for remote supervision of animals, and also means for enabling a user to remote supervise a milking station 2 by means of different kinds of communication units 7, 8 (mobile phones, laptops, PDAs etc.), the different communication units including different interfaces.

The system may also include safety measures in order to prevent an unauthorized use of the system. The user may for example be requested to input a code, i.e. a password, before access to the system is granted. Other safety measures could include multiple codes (passwords), voice recognition and encryption or any combination thereof. The use of a firewall as a safety measure is also conceivable.

It should be appreciated that the means and steps of the described system and method, respectively, could be performed in another order than the one used in the described embodiment. For example, the user may send instructions first, where after a web-document is created. Other modifications and alterations are also apparent and are to be included within the scope of the appended claims.

Thus, while the invention has been described with reference to particular embodiments, it is to be understood that the invention is not limited to the particular forms illustrated. Modifications and alterations obvious to a person skilled in the art are to be included within the scope of the appended claims.